

Multiple Cause-of-Death Analysis of Hypertension-Related Mortality in New York State

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This is a revised version of a paper presented at the 20th National Meeting of the Public Health Conference on Records and Statistics held August 13-15, 1985, in Washington, DC.

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Synopsis.....

Multiple cause-of-death data—that is, records of all medical conditions listed on death certificates—

are used to study hypertension mortality in New York State during 1968-82. Mortality rates based on underlying causes for ischemic heart disease (IHD) and stroke are selected for comparison.

During 1968-78, white women showed the largest age-adjusted decline of all race-sex groups for hypertension, as white men did for stroke and nonwhite men did for IHD. White men showed the largest age-adjusted decline for all three diseases for 1979-82. In general, declines in hypertension death rates are more comparable to declines in stroke mortality than to IHD mortality.

OVER THE PAST 20 YEARS, THERE HAS BEEN A marked decline in the mortality rate for ischemic heart disease (IHD) (1). However, most studies of cause-specific circulatory disease are limited to examination of only underlying causes (2), without using the total occurrence of chronic circulatory conditions on death certificates to understand the links and interactions between chronic diseases (3). This paper uses multiple cause-of-death data, that is, records of all medical conditions listed on death certificates, to study the secular trends of hypertension mortality in New York State during 1968-82.

Hypertension is the most powerful of all risk factors for IHD (4). The 15-year period of 1968-82 marked increased activity in hypertension awareness and treatment programs, and information was needed on changes in hypertension mortality. In addition to mortality rates for hypertension, rates for IHD and stroke will be presented to show how trends in these mortality rates parallel the trends in hypertension mortality (5,6).

Materials and Methods

Mortality data for 1968-82 were coded to the eighth and ninth revisions of the International

Classification of Diseases Adapted (ICDA) for use in the United States (7,8). In the eighth revision, hypertension was coded under the special category for hypertensive disease (codes 400-404) as well as specific 4-digit codes under the broad 3-digit categories for IHD and stroke (all codes 410.0-414.0 and 430.0-438.0 with the fourth digit of 0; in addition, there were 2 codes, 412.1 and 412.2, indicating hypertension that were added after initial publication of the eighth edition). In the ninth revision (beginning in 1979), there is no separate category for malignant hypertension; instead, a new fourth digit for hypertensive disease is used to specify whether the disease is malignant or benign. The fourth digits in the eighth revision, denoting hypertension in ischemic heart and cerebrovascular disease, no longer exist, making it impossible to show hypertension with those conditions for underlying cause tabulations. Furthermore, the lack of the proper comparability ratio for all mentions of hypertension between the eighth and ninth revisions makes the analysis of hypertension-related mortality for 1968-82 more difficult.

Instead of attempting to develop a proper comparability ratio for all mentions of hypertension, the study period was divided into two periods, 1968-78 and 1979-82. Mortality data were

Table 1. Hypertension age-specific and age-adjusted death rates per 100,000 population, by race and sex for 1968–78 and 1979–82, New York State

Sex and age	Nonwhite						White					
	1968	1978	Percent change	1979	1982	Percent change	1968	1978	Percent change	1979	1982	Percent change
Men												
40–44 years	105.5	76.3	–38.3	55.9	44.1	–26.9	23.4	14.9	–57.0	8.2	9.9	17.6
45–49 years	209.0	153.4	–36.2	85.8	110.4	22.3	53.1	36.4	–45.9	30.3	25.7	–17.9
50–54 years	223.6	177.9	–25.7	181.8	153.9	–18.1	99.3	71.1	–39.6	55.3	44.5	–24.3
55–59 years	438.7	295.2	–48.6	256.4	252.5	–1.5	151.7	120.8	–25.6	100.7	78.4	–28.4
60–64 years	516.4	482.1	–7.1	268.2	286.5	6.4	279.4	220.0	–27.0	157.1	138.6	–13.3
65–69 years	738.0	539.2	–36.9	446.1	402.9	–10.7	409.9	322.5	–27.1	210.3	204.0	–3.1
70–74 years	909.8	885.4	–2.8	555.1	596.8	7.0	595.9	478.6	–24.5	348.3	291.7	–19.4
75–79 years	777.1	1,051.8	26.2	621.1	772.7	19.6	878.0	692.5	–26.8	457.2	448.9	–1.9
80–84 years	1,235.2	694.8	–77.8	968.4	1,193.4	18.9	1,237.9	942.5	–31.4	588.2	579.0	–1.6
85 years and older	911.2	631.3	–44.3	918.4	873.1	–5.2	1,395.9	1,180.9	–18.2	865.8	804.7	–7.6
Age-adjusted	359.6	293.4	–22.6	219.2	223.8	2.1	259.1	202.6	–27.9	142.6	128.9	–10.7
Women												
40–44 years	103.0	70.5	–46.1	40.0	31.6	–26.5	10.8	11.8	8.8	5.6	4.8	–16.6
45–49 years	148.5	109.5	–35.6	68.5	67.5	–1.5	26.9	19.9	–35.3	14.3	12.0	–19.0
50–54 years	261.5	165.1	–58.4	126.3	132.2	4.4	48.4	41.2	–17.3	26.0	29.0	10.4
55–59 years	360.6	324.1	–11.3	162.0	209.0	22.5	99.8	69.3	–44.0	46.9	45.4	–3.3
60–64 years	450.8	378.6	–19.1	251.5	262.8	4.3	195.1	127.4	–53.1	86.3	75.1	–15.1
65–69 years	594.6	445.6	–33.4	381.7	306.5	–24.5	342.5	239.5	–43.0	137.2	139.2	1.4
70–74 years	816.0	748.2	–9.1	527.7	639.8	17.5	570.2	400.1	–42.5	260.3	226.3	–15.0
75–79 years	1,049.5	1,041.8	–0.7	666.4	697.7	4.5	1,012.1	634.6	–59.5	423.4	386.7	–9.5
80–84 years	1,130.5	1,300.2	13.1	1,097.2	1,170.9	6.3	1,450.9	1,036.5	–40.0	709.7	603.1	–17.7
85 years and older	1,059.9	1,598.4	33.7	1,508.6	1,333.2	–13.2	1,858.3	1,666.4	–11.5	1,118.8	1,006.9	–11.1
Age-adjusted	343.8	294.8	–16.6	206.6	212.7	2.9	287.4	206.2	–39.4	135.4	122.6	–10.4

Table 2. Ischemic heart disease age-specific and age-adjusted death rates per 100,000 population, by race and sex for 1968–78 and 1979–82, New York State

Sex and age	Nonwhite						White					
	1968	1978	Percent change	1979	1982	Percent change	1968	1978	Percent change	1979	1982	Percent change
Men												
40–44 years	174.8	113.7	–53.7	74.6	75.1	0.6	125.1	79.2	–58.0	75.0	79.0	5.0
45–49 years	343.9	201.7	–70.5	174.6	206.3	15.4	249.8	205.2	–21.7	189.9	162.3	–17.0
50–54 years	527.7	401.0	–31.6	349.0	328.1	–6.4	475.3	367.3	–29.4	322.8	314.9	–2.5
55–59 years	880.2	596.5	–47.6	574.6	597.2	3.8	795.4	556.7	–42.9	540.3	499.1	–8.2
60–64 years	1,301.8	1,014.4	–28.3	776.0	961.1	19.3	1,324.1	941.4	–40.6	863.7	820.5	–5.3
65–69 years	2,008.4	1,251.3	–60.5	1,105.7	1,282.4	13.8	1,933.9	1,531.9	–26.2	1,334.0	1,323.9	–0.8
70–74 years	2,662.9	1,962.2	–35.7	1,771.1	2,015.3	12.1	2,966.0	2,280.5	–30.1	2,223.8	2,118.9	–5.0
75–79 years	3,261.2	2,924.6	–11.5	2,501.5	2,975.5	15.9	4,537.4	3,424.8	–32.5	3,210.9	3,266.4	1.7
80–84 years	4,572.9	3,440.9	–32.9	3,414.9	4,467.0	23.6	6,697.1	5,716.7	–17.2	4,882.4	4,911.0	0.6
85 years and older	5,770.7	4,368.7	–32.1	5,664.4	7,203.3	21.4	9,986.7	9,781.5	–2.1	8,982.7	8,487.6	–5.8
Age-adjusted	924.1	665.4	–38.9	592.6	682.0	13.1	1,335.2	1,052.9	–26.8	965.3	937.2	–3.0
Women												
40–44 years	71.1	61.6	–15.4	32.4	40.8	20.5	24.7	19.6	–26.1	18.3	17.2	–6.0
45–49 years	156.8	90.8	–72.6	69.7	80.2	13.1	53.9	36.5	–47.6	34.0	36.8	7.6
50–54 years	329.6	163.7	–50.3	168.4	161.8	–4.1	116.2	74.6	–55.9	77.4	75.2	–2.9
55–59 years	473.7	348.8	–35.8	256.9	308.3	16.7	237.2	158.9	–49.3	150.9	152.8	1.2
60–64 years	754.1	555.7	–35.7	437.8	571.7	23.4	461.4	318.5	–44.8	313.8	308.0	–1.9
65–69 years	1,108.3	674.1	–64.4	633.2	764.0	17.1	903.6	599.4	–50.8	531.8	539.4	1.4
70–74 years	1,776.1	1,251.6	–41.9	1,029.1	1,302.4	21.0	1,696.8	1,103.5	–53.8	1,031.8	1,026.6	–0.5
75–79 years	2,836.3	2,204.4	–28.7	1,746.3	1,725.7	–1.2	3,073.6	2,035.3	–51.0	1,834.0	1,820.1	–0.8
80–84 years	2,666.0	2,574.2	–4.2	2,458.9	4,066.4	39.5	5,278.3	4,011.3	–31.6	3,470.5	3,274.6	–6.0
85 years and older	4,842.1	5,139.6	5.8	4,576.8	5,702.4	19.7	9,401.7	8,915.9	–5.5	7,229.9	7,265.4	0.5
Age-adjusted	633.4	456.6	–38.7	384.6	474.3	18.9	935.2	697.4	–34.1	613.9	606.6	–1.2

coded under the ICDA revision appropriate for that period (the eighth revision for 1968–78 and the ninth revision for 1979–82). Two independent analyses on changes in hypertension mortality over the two periods are presented.

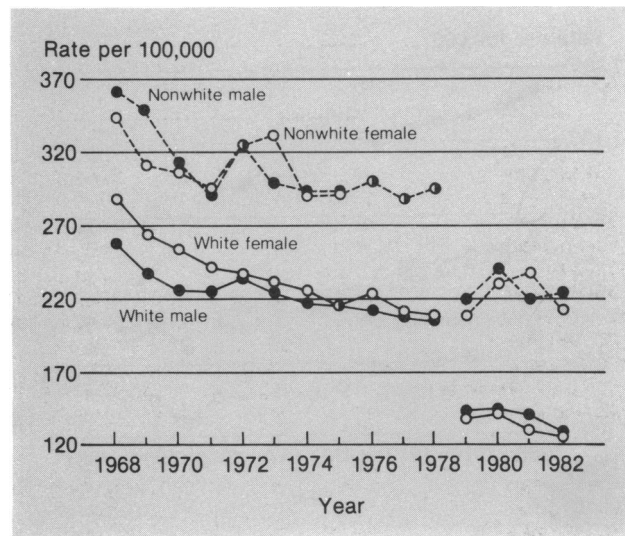
Sex- and race-specific death rates were based on all deaths with a mention of hypertension, as well as for IHD and stroke as the underlying cause of death, for 1968–82 and for age groups from 40–44 to 85 and older. The mortality data for the study period were abstracted from New York State multiple cause mortality files produced by the National Center for Health Statistics. Because all New York State mortality data for the year 1972 are only available as a 50 percent sample, the sample size for 1972 was simply doubled to obtain complete counts. Denominators for 1971–77 were obtained from population estimates made by the Bureau of the Census. Denominators for the years 1968, 1969, and 1978–82 except 1980 were derived from population estimates made by the Bureau of Biostatistics, New York State Health Department. The 1970 and 1980 populations were based on figures from the Bureau of the Census. Age-adjusted death rates were calculated on the basis of the New York State population age distribution for 1970.

Results

Hypertension. Figure 1 shows that the age-adjusted rate of hypertension mentions among white women tended to be higher than for white men between 1968 and 1978 except in 1975. However, the opposite was true between 1979 and 1982. This reversal is perhaps due to the exclusion of codes 410–414 and 430–438 in the ninth revision of the ICDA. For nonwhites, the age-adjusted rates for men were always higher than for women except in 1971, 1973, 1978, and 1981. The rate for nonwhites was always higher than that for whites regardless of sex. The overall declines in the rate of hypertension mentions for the four race-sex groups are represented by the percent change in the age-adjusted rates for 1968–78 and 1979–82. The largest decline for 1968–78 was experienced by white women (39.4 percent), followed by white men (27.9 percent), nonwhite men (22.6 percent), and nonwhite women (16.6 percent). For 1979–82, whites experienced a smaller decline; however, nonwhites experienced a 2–3 percent increase in the age-adjusted rate of hypertension mentions.

The age- and sex-specific rates of hypertension mentions were greater for nonwhites than for

Figure 1. Age-adjusted death rate for hypertension, New York State, 1968–82



whites except at older ages. Rates for males were higher than for females at younger ages, but the pattern reversed at older ages. The race crossover is not observed in 1979–82, but the sex crossover is still apparent. Dramatic declines occurred in younger white men, followed by younger nonwhite women, older nonwhite men, and older white women. This pattern did not continue in 1979–82 (table 1).

Ischemic heart disease. Wing and Manton (5) pointed out that hypertension is a common precursor of both IHD and stroke. Although hypertension is often viewed as a circulatory disease risk factor, IHD and stroke are frequently acute manifestations of underlying processes such as hypertension and atherosclerosis. Therefore, data for temporal trends in the underlying cause mortality rates for IHD and stroke are presented so that their similarity to and differences from the trends for hypertension mentions can be evaluated.

Whites tended to have higher age-adjusted IHD death rates than nonwhites in the first study period, 1968–78. During the second period, 1979–82, the rates for men of both races were greater than for women (fig. 2). This pattern of the first period for IHD mortality was quite different from hypertension mortality rates, in which nonwhites of both sexes have higher rates than whites.

The largest decline in IHD mortality occurred among nonwhites of both sexes, followed by white women and white men during 1968–78. Whites continued experiencing declines in total age-

Figure 2. Age-adjusted death rate for ischemic heart disease, New York State, 1968-82

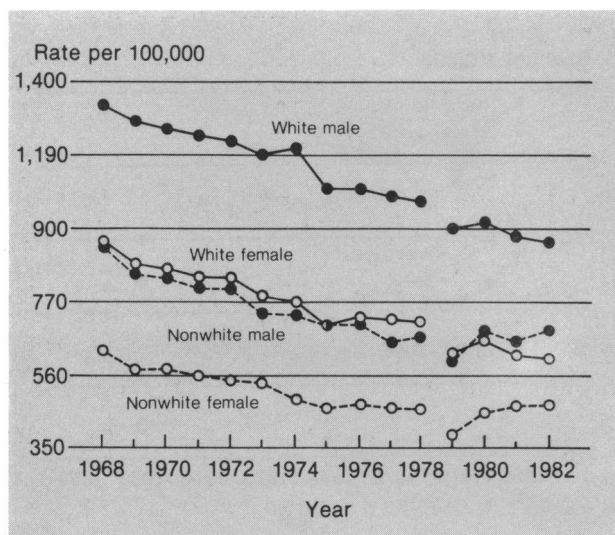
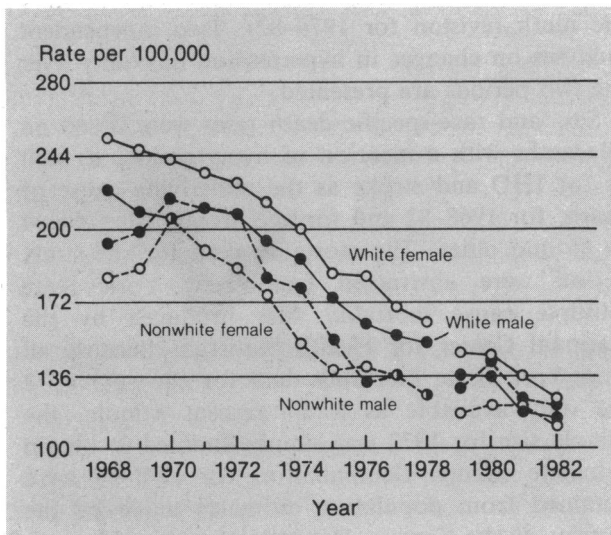


Figure 3. Age-adjusted death rate for stroke, New York State, 1968-82



adjusted IHD mortality in 1979-82. Like the changes in hypertension mentions for 1979-82, the total age-adjusted IHD death rates for nonwhites showed increases, with higher percentages than hypertension death rates. Total age-adjusted declines in IHD were less than hypertension declines for whites in both periods, but greater for nonwhites in 1968-78 (table 2).

Underlying cause-of-death rates for IHD—the leading cause of death in the United States as well as in New York State—were higher than rates of hypertension mentions for all ages, for all race-sex groups, and during the entire period studied (1968-82). As with hypertension, the rates were greater for nonwhites than for whites at younger ages (table 2). The race crossover started at younger ages for men than for women in both periods. Unlike the rates for hypertension, rates for males were almost always higher than rates for females.

As observed for hypertension, there were major differences in age-specific declines between race-sex groups. Dramatic declines in IHD death rates, unlike the declines in hypertension mortality, were concentrated in the younger age groups, with nonwhite women experiencing the largest age-specific declines among all four race-sex groups except age 85 and older (table 2). In general, all four race-sex groups showed small-to-moderate declines at all ages during 1968-78 except nonwhite women ages 85 and older. The magnitude of declines in IHD rates was greater than that of declines in hypertension mentions during 1968-78.

For 1979-82, declines in IHD death rates for whites, similar to the declines in hypertension mentions, were concentrated in the younger age groups, with white men experiencing the largest age-specific declines of any of the four race-sex groups (17.0 percent at ages 45-49) (table 2). Compared with hypertension mentions, the declines in IHD death rates were less, but the age pattern was very similar.

Stroke. Figure 3 indicates that the age-adjusted death rate for stroke for white men was less than for white women, and for nonwhite men, greater than for nonwhite women except in 1976 and 1978. This pattern was very similar to that of hypertension mentions in 1968-78. However, the pattern became quite different in 1979-82. For comparison between races, whites had higher rates than nonwhites except in 1970, 1972, and 1980-82. This pattern was different from that of hypertension but similar to that of IHD.

Total age-adjusted declines for stroke were the largest of any of the three diseases in both periods. Differences were larger than for IHD. Men experienced greater declines for stroke than did women in 1968-78. Whites experienced larger declines than nonwhites in 1979-82. Unlike hypertension and IHD mortality, stroke mortality among nonwhites declined, with nonwhite women experiencing the smallest declines among all four race-sex groups.

Table 3 shows that rates for stroke were greater for nonwhites than whites for almost all age groups except ages 75 and older. Underlying

Table 3. Stroke age-specific and age-adjusted death rates per 100,000 population, by race and sex for 1968-78 and 1979-82, New York State

Sex and age	Nonwhite						White					
	1968	1978	Percent change	1979	1982	Percent change	1968	1978	Percent change	1979	1982	Percent change
Men												
40-44 years ...	51.2	40.2	- 27.4	28.6	21.5	-33.3	15.0	10.3	- 45.8	8.7	7.9	-11.3
45-49 years ...	80.9	52.6	- 53.8	55.7	65.6	15.1	24.8	14.9	- 66.4	15.9	18.4	13.2
50-54 years ...	102.9	58.7	- 75.2	78.8	66.0	-19.5	48.2	22.1	-117.3	29.1	19.1	-52.3
55-59 years ...	209.8	120.1	- 74.7	110.9	119.8	7.4	77.0	37.4	-105.9	48.9	37.5	-30.4
60-64 years ...	297.7	165.6	- 79.7	171.9	147.1	-16.9	138.5	84.0	- 64.9	83.3	63.4	-31.4
65-69 years ...	383.0	228.1	- 67.9	242.2	211.1	-14.7	271.4	148.3	- 83.0	142.7	126.9	-12.5
70-74 years ...	650.9	393.5	- 65.4	333.0	347.3	4.1	526.4	317.6	- 65.7	321.4	236.6	-35.9
75-79 years ...	707.7	525.9	- 34.6	442.4	419.2	- 5.5	970.7	557.2	- 74.2	517.2	458.2	-12.9
80-84 years ...	709.6	529.4	- 34.1	1,036.4	757.9	-36.7	1,574.0	1,070.3	- 47.1	947.6	852.1	-11.2
85 years and older	1,025.1	808.1	- 26.9	826.7	873.1	5.3	2,549.4	1,961.5	- 30.0	1,807.9	1,586.8	-13.9
Age-adjusted...	200.9	126.5	- 58.8	130.0	121.2	- 7.2	227.2	140.9	- 61.2	136.0	114.8	-18.5
Women												
40-44 years ...	53.3	25.7	-107.0	20.5	23.5	12.5	11.8	10.6	- 10.6	9.6	7.2	-34.2
45-49 years ...	61.1	38.6	- 58.3	39.7	22.9	-73.1	24.0	15.3	- 57.1	15.8	12.0	-31.4
50-54 years ...	96.7	71.5	- 35.2	52.0	66.1	21.3	36.6	27.1	- 34.9	23.4	21.4	- 9.2
55-59 years ...	136.6	115.2	- 18.6	78.8	81.5	3.3	59.1	31.0	- 90.7	37.9	28.4	-33.9
60-64 years ...	221.3	117.3	- 88.6	108.6	124.3	12.7	96.7	66.0	- 46.5	57.0	47.5	-20.1
65-69 years ...	319.9	180.5	- 77.2	180.9	153.2	-18.1	203.7	113.4	- 79.6	108.8	95.0	-14.6
70-74 years ...	549.4	303.4	- 81.1	323.2	293.8	-10.0	425.2	230.1	- 84.8	200.3	176.6	-13.4
75-79 years ...	576.7	489.2	- 17.9	418.3	414.0	- 1.1	805.1	477.8	- 68.5	434.8	359.2	-21.1
80-84 years ...	1,001.3	680.6	- 47.1	734.7	753.4	2.5	1,548.7	1,016.0	- 52.4	883.0	742.2	-19.0
85 years and older	1,101.4	1,487.8	26.0	1,419.1	1,064.3	-33.3	2,800.1	2,117.4	- 32.2	1,871.9	1,626.9	-15.1
Age-adjusted...	183.6	127.4	- 44.2	116.7	110.5	- 5.6	253.1	163.0	- 55.3	146.4	124.3	-17.8

cause-of-death rates for stroke were lower than rates of hypertension mentions for most age and race-sex groups except for a few older groups (75-79, 80-84, and 85 and older).

Stroke mortality declines by age groups were generally more uniform during 1968-78 than 1979-82, with white men and nonwhite women having greater declines. During 1968-78, white men ages 50-54 experienced an age-specific decline in stroke that was the largest of a race-sex group for any of the three diseases (117.3 percent). White women experienced their largest decline, almost 91 percent, at ages 55-59, with their smallest decline in the youngest age group (ages 40-44). As with hypertension, nonwhite women had an increase (26.0 percent) between 1968 and 1978 in stroke mortality at age 85 and older, but the increase was less than that of hypertension (33.7 percent). The largest decline in stroke mortality, for nonwhite women, occurred at ages 40-44.

Declines in stroke mortality among nonwhite men were fairly consistent among the age groups, with only the youngest and the oldest age groups showing declines during 1968-78 of less than 30 percent. The age pattern for stroke mortality is more consistent than that of hypertension men-

tions. For nonwhite men, the largest decline for stroke was among those ages 60-64; for hypertension, the largest declines were among some of the older age groups (ages 80-84, 55-59, and 85 and older). White men were the only race-sex group with an age pattern of stroke mortality declines more consistent with declines for hypertension and IHD, with the largest decline below age 55, moderate declines at 55-79, and smaller declines at the oldest age groups (table 3).

During 1979-82, the largest decline for stroke in white men occurred among those who were ages 50-54; for white women, ages 40-44; for nonwhite men, ages 80-84; and for nonwhite women, ages 45-49 (table 3). White women were the only group that experienced a decline in stroke in every age group. The other three groups showed increases in stroke mortality rates in some age groups.

Conclusion

The data presented strongly suggest that there has been a major reduction in hypertension mortality in New York State over the 15-year period of 1968-82. This reduction is especially significant because of the extremely widespread attention

given to hypertension during this period. Other contributors to decreased mortality were the development of effective therapy for hypertension, increased professional and public awareness concerning cardiovascular and cerebrovascular risk factors, and significant changes in lifestyles, such as increased physical activity and reduced cigarette smoking. Therefore, substantial declines observed in the data probably reflected, to some extent, the reality recorded on death certificates.

A possible problem in interpreting the data presented is that in 1968 there was an epidemic rise in mortality from influenza and pneumonia (9), and the declines since 1968 are possibly attributable to lower rates of influenza and pneumonia (6). However, New York State hypertension death rates from multiple cause mortality data for 1969 were examined and shown to be only slightly lower than in 1968; furthermore, the New York State data and those of the United States are consistent (6). Cooper and coworkers (10) also indicated that declines in influenza and pneumonia may actually be secondary to those for cardiovascular disease during 1968-69.

Declines in the multiple cause hypertension death rates were generally more comparable to declines in underlying cause mortality for stroke than for IHD over the study period, especially 1968-78. The declines in the age-adjusted hypertension mortality rates were greater than declines in IHD mortality for whites only but less than declines in stroke mortality for both whites and nonwhites. Only whites showed age-specific changes in stroke mortality that closely paralleled the trends for hypertension mentions during 1968-78. In this study, white women showed the largest age-adjusted decline of all race-sex groups for hypertension, as white men did for stroke and nonwhite men did for IHD during 1968-78.

White men showed the largest total age-adjusted decline with all three diseases in 1979-82. This finding is very different from the pattern in North Carolina, where nonwhite women showed the largest total age-adjusted decline of all race-sex groups for both hypertension and IHD (5). This difference might be due to the heterogeneity of nonwhite groups in New York State. It means that the interaction between hypertension and other risk factors is probably different in different populations and that one group responds more favorably to reductions in blood pressure than other groups at different periods in their lives. The difference could also mean that whites are more likely to receive medical care and to follow treatment

programs, and that they more readily increase physical activity and reduce smoking than nonwhites. The crossover effect observed at older age groups between whites and nonwhites still deserves further study to determine whether the quality of data itself, as suggested by Coale (11), is a factor.

This paper has demonstrated the usefulness of multiple cause information on the total mentions of hypertension on New York State death certificates during 1968-82. Because there is no method for estimating the proportion of the total population with certain chronic diseases, most health department programs are frustrated by the lack of such information. Using information from total mentions on multiple cause-of-death files might be a way to estimate the proportion of the total population with, for example, hypertension. In combination with properly developed comparability ratios for condition codes and improved standards for death certificate diagnosis of hypertension and other chronic degenerative conditions, multiple cause mortality data can be an important source of information for assessing broad patterns in public health.

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Use of Antiepileptic Drugs in the Elderly Population

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The paper was also presented at the 15th Epilepsy International Symposium on September 30, 1983, held in Washington, DC. The paper was prepared in association with the University of North Carolina Area Health Education Program. The study was conducted in Greensboro and Winston-Salem, NC.

THE NEED TO MINIMIZE DRUG USE by the elderly and avoid the risk of toxicity and drug-related costs is a frequent theme in articles about drug use among the elderly (1,2). The antiepileptic drugs are potentially toxic and require therapeutic drug monitoring, adding to the cost of drug therapy (3). Limited information about antiepileptic drug use in extended care facilities indicates that, for more than one-third of patients, there was no documented reason to use these drugs (4,5). In describing inappropriate use of antiepileptic drugs, Moseley and Penry discussed inadequate doses, lack of therapeutic drug monitoring, administration of antiepileptic drugs on an "as needed" basis, and the use of intramuscular phenytoin which is erratically absorbed (4). We reviewed medical records of patients in two extended care facilities to evaluate use of antiepileptic drugs.

Methods

Two extended care facilities for skilled and intermediate care patients (facilities A and B) were selected for review of all medical records of

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Synopsis

Medical records for 572 patients in two extended care facilities were reviewed to study seizure disorders and antiepileptic drug use. Seventy patients (12.2 percent) were receiving antiepileptic drugs. Of this group, 43 patients (61.4 percent) had a diagnosis of epilepsy or documented seizures, 2 were being treated for neuralgia, and 25 (35.7 percent) had no reason given for antiepileptic use. The most common cause was cerebrovascular accident (38.9 percent), and no associated etiology was found in 29.2 percent. Phenytoin was the most commonly used agent. Thirty-two (45.7 percent) were taking two or more antiepileptic drugs. Thirteen patients had had no serum concentration monitoring in the last year. Thirty-seven patients (52.9 percent) had had at least one serum concentration outside of the therapeutic range.

patients present at the facilities on a single day in September 1982. Data collected from a retrospective review of all patients receiving antiepileptic drugs included documentation of a seizure or suspected seizure disorder; documentation of other possible reasons for using the drugs; possible etiologies for seizures; age and sex of the patient; the names, numbers, and doses of antiepileptic agents used; and results of serum concentration monitoring within the past year.

In a second study, medical records of all patients who received antiepileptic drugs in 1982 were reviewed at facility A. Patients who had antiepileptic therapy discontinued were monitored for recurrence of seizures and reinstitution of antiepileptic drugs. Following consultation between the physician responsible for the patients and a clinical pharmacist, antiepileptic agents were discontinued in additional patients, and these patients were monitored prospectively.

Results

A total of 572 patients' records were reviewed,